

1. *Sub-in.* Of all the strategies, this is the most important. To sub-in means to substitute, to select friendly numbers for the variables in the problem.

(Note: Subbing-in once usually works, but it's possible you may have found a special case or you may have made an arithmetic error. So, if you have the time, try a second substitution.)

*Example 1* If  $\frac{3}{4}$  of the citizens in New York cast their votes for Proposition A, and  $\frac{4}{5}$  of the remaining citizens cast their votes for Proposition B, what fraction of the votes were cast for Proposition C?

- (A)  $\frac{1}{20}$  (B)  $\frac{1}{9}$  (C)  $\frac{1}{5}$  (D)  $\frac{2}{5}$  (E)  $\frac{9}{20}$

*Example 2* The sum of three consecutive integers is  $k$ . What is the greatest of these integers in terms of  $k$ ?

- (A)  $\frac{1}{3}k - 1$  (B)  $\frac{1}{3}k + 1$  (C)  $k - 3$  (D)  $k + 2$  (E)  $3k + 3$

2. *Backfill.* If the problem is simple enough and you want to avoid doing the more complex algebra, or if the problem presents a phrase such as ( $x = ?$ ), then just fill in the answer choices that are given in the problem until you find the one that works. Obviously, one of them must be right.

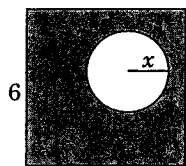
*Example 1* If the difference between one-third of a number and one-seventh of that same number is 8, then what is the number?

- (A) 12 (B) 21 (C) 30 (D) 42 (E) 56

*Example 2* If  $\left(\frac{a}{2}\right)^3 = a^2$  and  $a \neq 0$ , then  $a =$

- (A) 2 (B) 4 (C) 6 (D) 8 (E) 10

3. *Always scan the answers.* Quickly scan the answers to get a math sense of the direction in which to go. That is, are you looking for fractions, decimals, percents, integers, squares, cubes, perimeters, areas, and so on? Eliminate certain choices that don't make sense.



*Example* In the figure above, a small circle with radius  $x$  is inside a larger square with side 6. What is the area, in terms of  $x$ , of the shaded region?

- (A)  $12 - 2\pi x$  (B)  $12 - \pi x^2$  (C)  $36 - 2\pi x$   
(D)  $\pi x^2 - 36$  (E)  $36 - \pi x^2$

4. *Do not waste time doing complex arithmetic or lengthy algebraic solutions.* If you find yourself bogged down, you have probably missed the point of the problem.

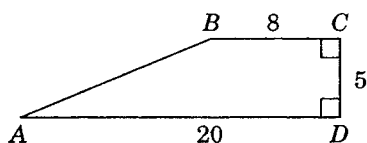
*Example 1* If  $x = \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times \frac{5}{6} \times \frac{6}{7} \times \frac{7}{8} \times \frac{8}{9} \times \frac{9}{10}$ , then the value of  $x$  is

- (A)  $\frac{1}{2}$  (B)  $\frac{1}{3}$  (C)  $\frac{2}{9}$  (D)  $\frac{1}{5}$  (E)  $\frac{1}{10}$

*Example 2* The sum of 5 consecutive integers is 1,000. What is the value of the greatest of these integers? (Student-Produced Response)

5. *Fill in what is known to help you find what is unknown.* In geometry problems where the figure is drawn to scale, do the work on the given figure. The picture itself provides visual information useful in solving the problem. On all *drawn-to-scale* geometry figures, all angles and lines that “look” equal *are* equal. Feel free to draw in lines and angles, and extend lines. Marking given measurements in the diagram not only clarifies the problem, but usually saves time because the joining of hand, eye, and mind tends to give you direct insight into the problem.

*Example*

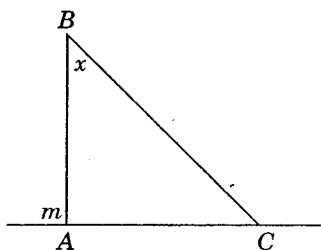


In the figure above, what is the length of segment  $AB$ ?

- (A) 10 (B) 11 (C) 12 (D) 13 (E) Cannot be determined

6. *Recognize “Figure not drawn to scale” as a warning.* Proceed with caution! If a geometry problem has these words of warning, you can usually assume that (a) the picture is misleading, (b) the answer choice closest to the given visual setup is probably incorrect, and (c) you should probably *redraw the figure accurately*. This new drawing should clue you in to the real relationships.

*Example*



Note: Figure not drawn to scale

In the figure above,  $AB = BC$ . If  $x = 30^\circ$ , what is the degree value of  $m$ ?

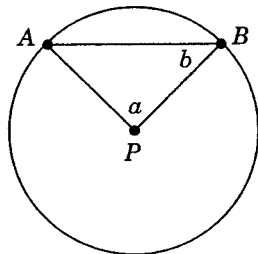
- (A) 75 (B) 105 (C) 130  
(D) 135 (E) 150

7. *Test the extremes.* If you are given a range of values, say,  $4 < x < 9$ , first test the extremes (4 and 9) and not the numbers in between. The answer should be obvious.

*Example 1* If  $y = 4x - 3$  and  $0 < x < 3$ , then  $y$  is between

- (A) -3 and 9                      (B) -2 and 10                      (C) 0 and 12  
(D) 1 and 5                        (E) 1 and 9

*Example 2*



In the circle above, with  $P$  as the center,  $0 < a < 50$ . What are all the possible values of  $b$ ?

- (A)  $b > 65$                       (B)  $65 < b < 90$                       (C)  $65 \leq b \leq 90$   
(D)  $65.5 \leq b \leq 89.5$                       (E)  $0 < b < 130$

8. *Find a pattern.*

*Example* If  $n$  is a positive integer, which of the following cannot be the units digit of  $7^n$ ?

- (A) 1                                  (B) 3                                  (C) 5  
(D) 7                                  (E) 9

9. *Do not be misled by generic answers.* What about the choices such as “None of the above,” or “It cannot be determined from the information given,” or “All of the above”? If you are just making a wild guess, ignore these choices. These are only good choices if all other choices have clearly been eliminated.
10. *Do the math.* This is the ultimate strategy. Don’t go wild searching in your mind for tricks, gimmicks, or math magic to solve every problem. After all, this is a math test. Most of the time the best way to solve a problem is to *do the math and solve the problem*.